Gene Regulation

Principal Investigator Koji Hisatake

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Other Faculty Members

Associate Professor: Aya Fukuda
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Major Scientific Interests of the Group

Our group studies the regulation of eukaryotic gene expression, focusing on how transcription regulates cell differentiation. In particular, we are studying the roles of transcription factors and epigenetic changes in regulating iPS cell induction and adipocyte differentiation.

Projects for Regular Students in Doctoral or Master's Programs

1) Mechanistic analyses of the roles for Oct4, Sox2, Klf4 and c-myc during iPS cell induction.
2) Analyses of epigenetic mechanisms of iPS cell induction.
3) Functional analyses of transcription factors involved in adipocyte commitment.
4) In vivo imaging and mechanistic analyses of beige adipocyte differentiation in mouse

Study Programs for Short Stay Students (one week ~ one trimester)

1) Analysis of transcriptional regulation during adipocyte differentiation.
2) Induction of iPS cells using a Sendai virus-based vector.

Recent Publications

1) **Nishimura K**, Ishiwata H, **Sakuragi Y**, **Hayashi Y**, **Fukuda A**, **Hisatake K**: Live-cell imaging of subcellular structures for quantitative evaluation of pluripotent stem cells. **Sci. Reports**, in press (2019).
2) **Tran THY**, **Fukuda A**, **Aizawa S**, **Bui PL**, **Hayashi Y**, **Nishimura K**, **Hisatake K**: Live cell imaging of X chromosome reactivation during somatic cell reprogramming. **Biochem. Biohys. Rep.**, 15:86-92(2018).
3) **Nishimura K**, **Aizawa S**, **Nugroho FL**, **Shiomitsu E**, **Tran YTH**, **Bui PL**, **Borisova E**, **Sakuragi Y**, Takada H, Kurisaki A, **Hayashi Y**, **Fukuda A**, Nakanishi M, **Hisatake K**: A role for KLF4 in promoting the metabolic shift via TCL1 during induced pluripotent stem cell generation. **Stem Cell Reports** 8(3), 787-801 (2017).
4) **Hayashi Y**, Hsiao EC, Sami S, Lancero M, Schlieve CR, Nguyen T, Yano K, Nagahashi A, Ikeya M, Matsumoto Y, **Nishimura K**, **Fukuda A**, **Hisatake K**, Tomoda K, Asaka I, Toguchida J, Conklin BR, Yamanaka S: BMP-SMAD-ID promotes reprogramming to pluripotency by inhibiting p16/INK4A-dependent senescence. **Proc. Natl. Acad. Sci. USA.** 113(46), 13057-13062 (2016).
5) Nakadai T, **Fukuda A**, Shimada M, **Nishimura K**, **Hisatake K**: The RNA binding complexes NF45-NF90 and NF45-NF110 associate dynamically with the c-fos gene and function as transcriptional coactivators. **J. Biol. Chem.** 290(44), 26832-26845 (2015).
6) **Nishimura K**, **Kato T**, **Chen C**, **Oinam L**, **Shiomitsu E**, **Ayakawa D**, Ohtaka M, **Fukuda A**, Nakanishi M, **Hisatake K**: Manipulation of KLF4 expression generates iPSCs paused at successive stages of reprogramming. **Stem Cell Reports** 3(5), 915-929 (2014).
7) **Fukuda A**, Shimada M, Nakadai T, **Nishimura K**, **Hisatake K**: Heterogeneous Nuclear Ribonucleoprotein R Cooperates with Mediator to Facilitate Transcription Reinitiation on the c-Fos Gene. **PLoS ONE** 8(8): e72496. doi:10.1371/journal.pone.0072496 (2013).